

National Polar-orbiting Operational Environmental Satellite System (NPOESS) Ground Segments



On May 5, 1994, President Clinton signed a National Science & Technology Council Presidential Decision Directive, to establish "...a single, converged, operational [environmental satellite] system [that] can reduce duplication of efforts in meeting common requirements while satisfying the unique requirements of the civil and national security communities."

Key Features and Benefits

- Combines multiple technologies into a single program for the first time
- Satisfies diverse civil, military and scientific environmental needs
- Innovative, fully integrated global ground system that speeds data delivery
- High-performance data processing design
- User-tailored, flexible data delivery subscription
- Flexible, scalable, modular architecture evolves with dynamic needs
- Extensive C3 operational heritage provides proven reliability
- Enterprise Management ensures high system availability
- Optimal human-machine mix delivers low operations cost

From farmers and fighter pilots to fishermen and forecasters, getting timely and accurate weather reports can mean all the difference between success and disaster.

Precise predictions help farmers fend off frost and guard against hail, protecting crops. They aid sailors gauge ocean winds, waves and currents to improve vessel routing for safety, fuel savings and efficient operations. Combat pilots, armed with accurate environmental information, can rendezvous safely with aerial tankers for in-flight refueling and increase the precision of air strikes.

Improved early warning can also lessen the devastating effects of tornados, floods and severe storms through disaster planning and response, reducing the potential loss of life and property.

Although today's weather satellites provide a wealth of information, the data and resulting products are often-times hours old before reaching decision makers and other users.

The nation's next-generation environmental satellite system – the National Polar-orbiting Operational Environmental Satellite System, or NPOESS for short, – will cut the time between observation and delivery from hours to minutes.

Users in civil and military, scientific and operational communities will put NPOESS data to work immediately through faster access to vital data and better forecasts – saving lives, planning successful military campaigns, minimizing impacts to the national and local economies, and affecting long-range policy decisions.

NPOESS converges NOAA's Polar-orbiting Operational Environmental Satellite and DoD's Defense Meteorological Satellite Program into a single system to satisfy the nation's critical civil and national security requirements for space-based, remotely sensed environmental data. The most significant change in U.S. operational remote sensing since the launch of the nation's first weather satellite in

1960, NPOESS will significantly improve weather forecasting and climate monitoring.

NPOESS will go beyond legacy systems to meet additional civilian and military requirements, such as increased sensitivity in moisture and temperature profiles, high-resolution, multi-spectral imagery, exceptional data availability, and rapid data access.

For the military, NPOESS will shift tactical and strategic focus from "coping with and avoiding the weather" to anticipating, exploiting and precisely forecasting atmospheric, oceanographic and space environmental conditions.

The NPOESS program, overseen by the Integrated Program Office (IPO), is a joint effort of the Department of Defense, Department of Commerce and NASA.

The IPO and NASA have scheduled the launch of the joint NPOESS Preparatory Project (NPP) in 2006. NPP will fly key sensor technolo-

gies, reduce development risks, ensure continuity of key climate measurements, and demonstrate and validate new imaging and sounding technology, algorithms and pre-operational ground systems prior to the first NPOESS launch, slated for 2009.

Northrop Grumman Space Technology, the prime contractor, is responsible for overall system design and development, system engineering and integration, instrument acquisition and spacecraft assembly and test.

Raytheon Intelligence and Information Systems, under contract to Northrop Grumman, provides the full NPOESS ground capability, from design and development through operations and sustainment. The NPOESS Ground Segments consist of three main components.

The **Command, Control and Communications Segment (C3S)** manages the operational mission, including mission planning and resource scheduling, satellite command and control, active reception and accounting of mission data, enterprise management, anomaly resolution, system security, and reliable delivery of data to and from central users.

Our environment is constantly changing; consequently, environmental data's operational utility diminishes quickly with time. C3S addresses this issue with 15 unmanned, global ground stations, or data receptors, termed **SafetyNet™**, to receive mission data as NPOESS satellites pass overhead. These receptors, linked with high bandwidth commercial fiber, rapidly transport the data stream to the four data processing centers. Nearly all of the data is completely processed and data products delivered to the weather Centrals in less than 28 minutes from the time of collection, and 3/4 of the data within 15 minutes.

The system's nerve center, the **Mission Management Center**, provides the accurate, high-performance tools to precisely manage the entire NPOESS mission. These C3S tools provide the operations crew with keen technical insight and comprehensive operational oversight, a detailed mission planning capability, full control of space and ground assets, as well as continuous monitoring and assessment of overall system performance.

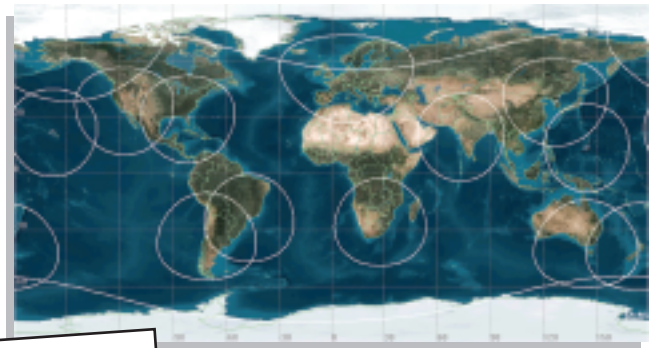
The **Interface Data Processing Segment (IDPS)** features high-speed, symmetric, multi-processing computers to rapidly convert the large streams of NPP and NPOESS sensor data into 55 distinct data products at four weather Centrals in the United States. These vital products, called environmental data records, range from atmospheric products detailing cloud coverage, temperature, humidity and ozone distribution; to land surface products showing snow cover, vegetation and land use; to ocean products depicting sea surface temperatures, sea ice and wave height; to characterizations of the space environment.

This wealth of information enables numerous users to monitor and predict changes in weather, climate, the ocean and the space environment. NPOESS products will also be available to the scientific community to expand our knowledge of the environment.

The **Field Terminal Segment (FTS)**, equipped with specially configured IDPS software, will allow worldwide fixed and mobile field terminals deployed aboard ships, at military bases, in theaters of operation, and at educational and scientific institutions to receive and process the NPOESS continuous broadcast of sensed data for a myriad of diverse applications.

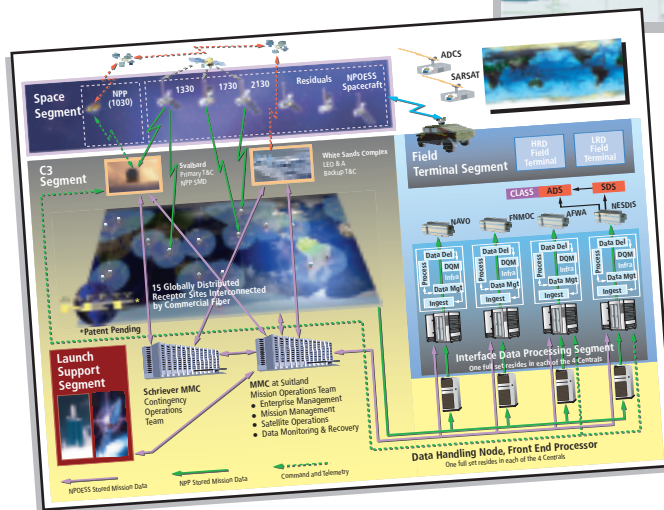
The NPOESS Program

- A Single Government — Contractor Team with a Common Vision, Mission, and Objective
- Timely, Accurate, Reliable Data from Sensors to Users
- Flexibility to Support NPOESS Growth and Evolution
- NPOESS - Serving The Nation's Needs for Decades to Come



NPOESS SafetyNet™ Sites

NPOESS Architecture



<http://www.ip.noaa.gov/>

SafetyNet™ - Patent pending by Northrop Grumman

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